M. Saleron made an experiment suggested by M. Ledieu, and which is a consequence of the fact above mentioned. If the light is received alongside the axis, the radiometer rotates. The velocity of the rotation is not yet in our hands.

The reflection of the light on the glass creates a disturbing force, as it is easy to show by the following experiment, which I made before the Academy of Sciences :— The bulb of an ordinary radiometer being half blackened, the rotation takes place in the same direction, whatever be the position of the blackened hemisphere, but at different rates. With the light falling on the white side, the rotation is reduced to about $\frac{1}{4}$, and about $\frac{3}{4}$ when falling on the blackened side. Both numbers give exactly 1, *i.e.*, the regular number of the translucid sphere. Consequently, I suppose the reduced rotation to be produced by the light reflected on the glass by the blackened surface, which light adds its effects to the light falling directly on the said blackened surface. This theory is in conformity with the well-known fact as stated by Crookes, that light A + light B gives one effect A + B, whatever be the respective situation of the lights on the circumference of a circle whose centre is the radiometer. I have no doubt that, by silvering the blackened hemisphere, which enlarges the reflecting power of the interior, the velocity of either rotation can be enlarged.

These remarks explain facts that, according to the dilatation theory, are a mere impossibility, the rotation in the same direction when a ray of light falls on the black or on the white side. These experiments can be made not only with a white or a black radiometer instead of alternate, but also with entirely transparent bulb, if light is predominant in one direction.

The difficulty in using the radiometer as a photometer is in the velocity of the revolutions. M. Gaiffe constructed for me a radiometer with a graduated screen which was in operation at La Villette Gas Works, and was sent to the lighthouse experimental establishment. Unfortunately that instrument requires a heliostat to send the rays into the aperture. Under that limitation the instrument works well, as the scale of proportion has been very easily established.

That reduction can be tried with a greater simplicity with a differential radiometer with plates differently coloured, the left with blue and the right with green or red. The rotation will be equal to the difference of rotating power, as demonstrated by the radiometer with both sides blackened. I suppose that white-blue + blue-black will give almost exactly the number of white-black, and that the rotating force might be so easily fragmentised. By a graduation all these different radiometers can be compared with each other.

Some of these radiometers are being constructed according to my suggestion by M. Gaiffe, and will be presented to the Academy as soon as the aforesaid theory shall have been demonstrated experimentally.

W. DE FONVIELLE

PROF. STEERE'S EXPEDITION TO THE PHILIPPINES

IT may interest zoologists to know that an American gentleman, Prof. J. B. Steere, of the University of Michigan, has recently returned from an expedition to the Philippine Islands, bringing with him large collections of natural history objects. The birds he has submitted to me, and I am now engaged in preparing a memoir on the collection, which seems to be one of the most important ever made in the Indo-Malayan Islands. In spite of the great difficulties which meet the traveller in the Philippine group, and notwithstanding severe attacks of fever, Dr. Steere exerted himself with great energy, and as he visited many islands in which no previous collection had ever been made, it is not surprising that many novelties occur in the one he has now brought over to England for description.

Leaving Hongkong for Manila, in May, 1874, Dr. Steere crossed the Island of Luzon by way of Mauban and Lucban to the Pacific, passing some time on the mountain of Ma-hay-hay, near the Laguna de Bay. In July he went by steamer to the colony of Puerto Princesa, on the east side of the Island of Palawan, where he stayed a month. From thence he crossed to the Island of Balabac and remained a month, afterwards visiting the south-east corner of the Island of Mindanao, and resting for a month and a half at Zamboanga and the Indian village of Dumalon in the same province. The Island of Basilan, lying between Mindanao and the Sooloo group, was next visited, and here he stayed two weeks, after which he returned to Zamboanga and thence to Manila. In the month of December he again went south, stopping at Ilo Ilo, on the Island of Panay, and visiting the mountains in the interior. After a short stay at the neighbouring Island of Guimaras he crossed over to Negros, journeying on horseback round the north end of the island ; thence in a native boat he traversed the sea to Zebu, which he crossed, till he arrived at the town of the same name, where he took horse again and rode southward, crossing the island once more and passing over the strait to the town of Dumaguete, on the Island of Negros. Dr. Steere then went back to Zebu and crossed to the Island of Bohol ; after passing round part of this island he returned to Zebu and afterwards to Manila, where he visited the Negritos on the north side of the Bay of Manila, leaving finally in April for Singapore.

Full descriptions of the new species will shortly be prepared, but meanwhile I cannot avoid drawing attention to one or two of the most remarkable forms, chief amongst which will be the following :—

Eurylæmus Steerii, Sharpe. Unlike any other member of the *Eurylæmiaæ*, no species of which was previously known to inhabit the group. It has a grey back, white collar round the neck, the head and rump deep purplish, the tail chestnut ; wings black with a yellow bar across the secondaries, white on the innermost ; sides of face and throat black ; rest of under surface white. The male differs in having the under surface purplish red. Hab. Basilan.

Phyllornis palawanensis, Sharpe, apparently different from every other *Phyllornis* by reason of its yellow throat, green under surface, and blue-edged primaries. There are other differences, but the above seems to be a combination of colouring not met with in the other species. Hab. Palawan.

Brachyurus Steerii, Sharpe. Green with a black head ; shoulders and a band across the rump bright cobalt ; tail black ; below verditer blue or light cobalt, the throat white ; centre of the abdomen black ; vent and under tail-coverts crimson. Hab. Dumalon, Mindanao.

It is, however, among the sunbirds that Dr. Steere seems to have discovered the most curious novelties, as will be seen from the following birds :—

Æthopyga magnifica, Sharpe, resembles *Æ. flavostriata*, Wallace, from Celebes, but is larger, with a stronger bill, black belly, and is at once to be told by its black underwing coverts. Hab. Negros.

Æthopyga Shelleyi, Sharpe, like *Æ. dabrii*, and *Æ. gouldiæ* in appearance, but without the elongated tail, and distinguishable at a glance by the entirely yellow under-surface, streaked on the breast with scarlet ; the throat is yellow, bordered with a double moustachial line of scarlet and steel blue. Hab. Palawan.

Æthopyga pulcherrima, Sharpe, a small species, probably generically distinct. Above olive-green, with a steel blue frontal patch, and streak over the ear-coverts ; wing-coverts, upper tail-coverts, and tail, metallic steel-green ; rump yellow ; wings olive ; under-surface entirely

bright yellow, with a spot of vermilion on the lower throat. Hab. Basilan.

Arachnothera dilutior, Sharpe, resembles *A. longirostris*, but is distinguishable by its brown lores and by the ashy whitish colour of the entire under-surface, only the flanks being slightly washed with sulphur-yellow; pectoral tufts orange-yellow. Hab. Palawan.

Dicæum dorsale, Sharpe. Looking at first sight like *Prionochilus percussus*, Temm. Blue-grey above with a conspicuous dorsal patch of orange-scarlet; underneath orange, paler yellow on the throat and abdomen. Hab. Palawan.

Dicæum hypoleucum, Sharpe, of the same group as *D. retrocinctum*, Gould, but plainer coloured, being entirely black above, and entirely white below (♂). Hab. Basilan.

Dicæum hæmatostictum, Sharpe, also of the same group as the preceding. Black above, white below, the centre of the body bright crimson, with a black band across the fore-neck. Hab. Guimaras.

R. BOWDLER SHARPE

SCIENCE IN GERMANY

(*From a German Correspondent*)

CIENKOWSKY, who several years ago made some exceedingly interesting communications on the low organisms known as Monads (*Archiv für Microscopische Anatomie*, i. 1865), has recently contributed more additional information regarding them and allied organisms (*ibid.*, xii. 1875). To the lowest order of plants belong the Myxomycetes, which, in the complete state, form protoplasmic nets, named plasmodia. Cienkowsky found such plasmodia in fresh water, which fed themselves by suction of algæ; on passage into the resting state, they fell asunder into several cysts, and (what is deserving of special attention), by the release of small portions from their mass, produced amœba, *i.e.*, self-supporting individuals, which creep about by means of pseudopodia, and which have hitherto been regarded as independent animal organisms. As this phenomenon has also been observed in other plasmodia (Brefeld), it is not improbable that very many amœba do not represent independent forms, but belong to the development cycle of other and plant-like forms. *Ciliophrys infusionum*, an organism which stands very near the animals named Actinophrys, is transformed while under the covering glass, into a swarmer (swarmspore), and when several individuals are connected, or one enters on the process of division, there arise as many swarmers as there were parts. Through this formation of swarmers there appears Heliozoa, which group belongs to the Actinophrys, closely related to Monads, or those lowest organisms which have been claimed both by zoologists and botanists as objects belonging to them. Among the Monads, Cienkowsky observes various encystments, divisions, and colony formations; but the most remarkable of such processes is that in *Diplophrys stercorea*, an extremely small cell-like organism with a yellow spot, and pseudopodia at two opposite ends of the body. These little bodies, observed in moist horse-dung, multiply by division, and form by union of pseudopodia, long strings in which separate individuals can glide to and fro. In several of the organisms he examined, Cienkowsky was able to observe the taking up of solid food by suction of algæ. Thus the boundary lines, which it has so long been usual to draw between plant and animal organisms, and between the individual groups of those lowest forms of life, appear more and more illusory, and the supposition is recommended of a common lowest kingdom of organisms, that of Protista (Haeckel), out of which animals and plants have by degrees been differentiated.

The Amphioxus, that remarkable animal which, by its position at the lower end of the series of vertebrates, is become much better known, even among the laity, than most of the other vertebrates, enjoys no less the continual attention of anatomists. Among the various recent works which have had Amphioxus for their subject, one of the most comprehensive is that of Langerhans (*Archiv für Microsc. Anatomie*, xii. 1875), from which I take some generally interesting data. The Amphioxus, it is known, is so indifferent in the fore-end of its body that opinions as to the extent to which it is to be regarded as a head, and what parts of it are to be compared to the characteristic parts of the head in other vertebrates, are still ever at variance with each other. Especially does the fore-end of the central nerve system receive various explanations, and Langerhans has set himself to determine more precisely its anatomical relations. The entire central nerve-system is a regular tube which only at the fore-end is somewhat enlarged. This part, therefore, has been named the brain, but it has been compared now with this, now with that, part of the brain of other vertebrates, according to the determination of the nerve proceeding from it. Now Langerhans shows that from the brain proceeds one pair, and somewhat further back a second pair, of nerves, which are distinguished from all other peripheric nerves, in that some ganglion cells are interposed in their course. They can only, therefore, be denoted as special brain nerves. Further, there is the left side extremity of the brain in front, the point of which is connected with the olfactory cavity, and which, as a hollow prolongation of the brain, can only be compared to a bulbus olfactorius, while the pigment spot referred to as an organ of sight lies also not outside of the brain (Hasse), but in its front wall (W. Müller). The fore-end, accordingly, of the central nerve-system of the Amphioxus, as far as behind the roots of the second nerve pair, is to be compared with the entire brain of other vertebrates, not with separate parts of it. Further, of the two higher organs of sense of the amphioxus, the organ of smell is allied to that of other vertebrates, the organ of sight to that of the Ascidians, whereby the relation between these latter, the Amphioxus, and the vertebrates, is confirmed. As to the significance of the body-cavity of Amphioxus, Langerhans is not yet very clear, and only the history of development can give satisfactory information regarding it. He found, however, that in this cavity lie not only the organs of sex, but also excreting glands, which may be regarded as kidneys; so that the space appears, at least physiologically, as the ventral cavity. Those glands which F. Müller had already observed, occur in peculiar folds of the epithelium of the ventral cavity, so that the excretion takes place directly into this cavity; a structure which is repeated at least in the embryonal organs of excretion of Amphibia (Goette). The sex organs of the Amphioxus are at first quite similar for both sexes, and placed indifferently; they arise from a thick-walled bladder, composed of quite homogeneous cells in the wall of the ventral cavity. At the time of sexual maturity, these indifferent cells are transformed either into semen-forming elements, spermatoblasts, or simply grow into eggs. Langerhans met with both sexual products in the same organ, so that perfect homology of these is established for Amphioxus, as Goette and Semper have previously affirmed it for Amphibians and Selachians; and the hypothesis of hermaphroditism as the original form of the sex organs must be rejected. After demonstrating for some other organs and tissues, the agreement of the amphioxus with other vertebrates, especially with Cyclostoma (and the hitherto doubtful presence of blood-capillaries in the former is confirmed), Langerhans comes to the conclusion that, in opposition to the view advocated by Semper, who disputes the affinity of Amphioxus to the vertebrates, such an affinity appears indubitable, from most of the anatomical relations.

NOTES

A NUMBER of highly interesting excursions has been arranged in connection with the meeting of the French Association at Clermont. One day will be devoted to a visit to the argentiferous lead-mines of Pontgibaud, the lavas of Volvic, the town of Riom. There will be a second excursion to Issoire, "celebrated for its college and its caldrons," wrote Voltaire; there will be a visit to the grottoes of Sonas on the same day. There may also be a third excursion to Thiers, the cutlery and paper manufactures of which are of interest. A last excursion, consisting of a visit to the thermal stations of Mont-Dore, Bourboule, and St. Nectaire, has somewhat trled the ingenuity of the local committee, as it will be difficult to get conveyances enough to carry the members to these somewhat distant points. But no doubt, as we said last week, the great attraction of this meeting will be the inauguration of the observatory on Puy-de-Dôme, which amid many difficulties has been established by M. Alluard. From the elevated summit, 1,480 metres, may be seen the fertile Limagne, the hills of Forez, the peaks of Mont Dore, and all